

Remarks

The Examiner rejected the Claims under 35USC102 over Hart for the reasons given in the third paragraph of her recent Office Action.

To clearly distinguish over the teachings of Hart, Claim 1 is amended to call for, inter alia, a step input to said set point generator for providing a set point current value to said set point generator; a pair of operational amplifiers and a pair of comparators interconnected together and with said bridge control circuit, said operational amplifiers being connected with said H-switch in feed back circuit arrangement;

a phase current sensing resistor connecting with inputs to said operational amplifiers for providing a sensing current value to said operational amplifiers;

an output of one of said comparators connects with said bridge control circuit to provide a forward current to said bridge control circuit and;

an output of another of said comparators connects with said bridge control circuit to provide a reverse current to said bridge control circuit;

whereby current in each phase of said multi-phase step motor is monitored and excess current above said set point current value is reduced thereby bringing current in said each phase down to said set point current value.

Whereas Hart appears to control motor current by adding current before the determination within the comparators resulting in excess current caused by back EMF, Applicants remove current before determination therein to remove excess phase current caused by back EMF, as

described in the specification beginning at line 29 on page 1 and continuing to line 2 on page 3.

The Examiner rejected the Claims under 35USC102 over Hale et al for the reasons given in the fourth paragraph of her recent Office Action.

Claim 16 is amended to call for, inter alia, determining pulse width modulation frequency associated with current in each phase of a multi-phase stepper motor; determining a maximum_pulse width modulation frequency; and adjusting said pulse width modulation frequency for said each phase current to a value less than said maximum pulse width modulation frequency.

Hale et al appear to use of the term “pulse width modulation” to describe the amount of time the bridge is “on”, not as a timing reference “TEST” signal as described by Applicants in their specification at page 3, beginning at line 13.

The Examiner rejected the Claims under 35USC103 over Hart and Hale et al for the reasons given in the sixth paragraph of her Office Action. It was the opinion of the Examiner that “it would have been obvious to use operational amplifiers connected to the current sensing resistor, since the operational amplifiers would (amplified) amplify the small voltage signal across the sensing resistor which will be later used by the voltage comparators to (determined) determine a reverse or forward current for the motor”

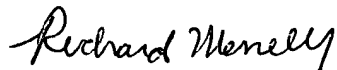
.Applicants respectfully submit the particular arrangement of the operational amplifiers, comparators and resistors as described in the specification and called for in the claims produce the unobvious

advantageous results described above which are not shown or suggested in combination of Hart and Hale et al as suggested by the Examiner. Applicants further submit that the Claims, as amended, patentably distinguish over the references C-H made of record in the Notice of References for all the noted reasons for the combination of Hart and Hale et al.

Accordingly, Applicants submit that the Claims are amended to obviate the reasons for the objections and rejections and are now in condition for allowance.

Allowance of amended Claims 1, 6-13,15 is now respectfully requested by the Examiner.

Respectfully submitted,



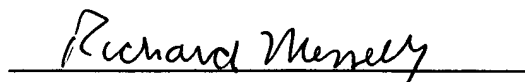
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CERTIFICATE OF MAILING

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited on the date shown below with the United States Postal Service in an envelope addressed to the Commissioner of Patents and Trademarks, Washington. D.C, 20231. 37 CFR 1.8(a) with sufficient postage or as first class mail on 11/13/04.



Richard Menelly.